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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/600,191

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Douglas L. Keil

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EXAMINER

ARANCIBIA, MAUREEN GRAMAGLIA

ART UNIT

PAPER NUMBER

1763

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
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3 MONTHS

02/23/2007

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary

Application No.

10/600,191

Applicant(s)

KEIL ET AL.

Examiner

Maureen G. Arancibia

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1763

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 01 December 2006.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 2,3,5-14 and 18-23 is/are pending in the application.
- 4a) Of the above claim(s) 11-14 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 2, 3, 5-14 and 18-23 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- ☐ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____.
- ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____.
- ☐ Notice of Informal Patent Application (PTO-152)
- ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 1 December 2006 has been entered.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. **Claims 5-8 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.**

Claims 5, 7, and 8 recite the limitation "confinement rings." There is insufficient antecedent basis for this limitation in the claim, since independent Claim 2, from which these claims ultimately depend, recites "at least one confinement ring," not "confinement rings." Claim 6 is rejected due to its dependence on Claim 5.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and

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the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 2, 3, 5-10, and 18-23 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent 6,074,518 to Imafuku et al. in view of U.S. Patent 6,019,060 to Lenz.

In regards to Claim 2, Imafuku et al. teaches a plasma processing apparatus for processing a substrate (Figures 11 and 12), comprising: a plasma processing chamber 2 with chamber walls (Figure 11); a substrate support 5 within the chamber walls; and a magnetic source for generating a magnetic field for magnetically enhancing the confinement of the plasma, wherein the magnetic source comprises a first magnetic element 73 comprising magnets 74 provided around the substrate support 5, and a second magnetic element 71 comprising magnets 72 provided around the upper electrode 2.

In regards to Claims 2, 9, and 20, Imafuku et al. does not expressly teach that the apparatus further comprises first and second confinement rings placed within and spaced apart from the chamber walls and between the first and second magnetic elements, such that the magnetic elements are spaced apart from the confinement rings and on opposite sides of the confinement rings, and placed such that magnetic field lines passing from the first magnetic element to the second magnetic element pass through the confinement rings; the confinement rings being moveable to define a variable gap used to vary pressure in the plasma volume.

Lenz teaches first and second confinement rings 316, 320 (Figure 3) placed within a chamber and spaced apart from the chamber walls (ex. Figure 1), the

confinement rings defining a plasma volume in combination with a substrate support 104, the confinement rings being moveable to define a variable gap used to vary pressure in the plasma volume. (Column 7, Lines 22-56)

It would have been obvious to one of ordinary skill in the art to modify the apparatus taught by Imafuku et al. to incorporate the vertically arranged and moveable confinement rings taught by Lenz. The motivation for making such a modification, as taught by Lenz (Column 7, Line 64 - Column 8, Line 25), would have been to allow local control of the pressure at the substrate surface during plasma processing, and thereby, among other benefits, to improve response time.

Since the first and second magnetic elements 73, 71 taught by Imafuku et al. are arranged around the substrate support and the upper electrode, respectively, they would have the claimed spatial relationship to the confinement rings taught by Lenz, and the vertical magnetic field produced by the magnetic elements would pass through the confinement rings, as broadly recited in the claims.

In regards to Claim 3, it is considered that the magnetic elements of Imafuku et al. would be inherently structurally capable of performing the intended use recited in the claim of producing a magnetic field that would increase collisions of charged particles with the confinement rings taught by the combination of Imafuku et al. and Lenz, due to the interaction between the vertical magnetic field and the charged particles in the plasma. It has been held that claims directed to apparatus must be distinguished from the prior art in terms of structure rather than function. *In re Danly*, 263 F.2d 844, 847, 120 USPQ 528, 531 (CCPA 1959). Also, a claim containing a "recitation with respect to

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the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus" if the prior art apparatus teaches all the structural limitations of the claim. *Ex parte Masham*, 2 USPQ2d 1647 (Bd. Pat. App. & Inter. 1987)

In regards to Claims 5 and 8, these claims recite relative dimensions of the first and second magnetic elements and the first and second confinement rings. The combination of Imafuku et al. and Lenz does not expressly teach a specific dimensional relationship between the magnetic elements and the confinement rings. However, in *Gardner v. TEC Systems, Inc.*, 725 F.2d 1338, 220 USPQ 777 (Fed. Cir. 1984), cert. denied, 469 U.S. 830, 225 USPQ 232 (1984), the Federal Circuit held that, where the only difference between the prior art and the claims was a recitation of relative dimensions of the claimed device and a device having the claimed relative dimensions would not perform differently than the prior art device, the claimed device was not patentably distinct from the prior art device. Similarly, in the instant case, the inner and outer diameter of the confinement rings is not believed to cause a difference in performance of the apparatus, since narrower or wider confinement rings would still be just as capable of closing and opening the variable gap. Therefore, the relative dimensions between the confinement rings and the magnetic elements is similarly considered not to patentably distinguish the claimed invention from that taught by the combination of Imafuku et al. and Lenz.

In regards to Claim 6, Imafuku et al. does not expressly teach that the diameter of the first magnetic element is not equal to the diameter of the second magnetic

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element. However, Imafuku et al. teaches that the magnetic elements generate a particular magnetic field that then determines the confinement of the charged particles within a plasma volume.

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention, as a matter of routine experimentation, to provide first and second magnetic elements having different diameters, in order to optimize the particular magnetic field that is produced and the confinement of the charged particles within the plasma volume.

In regards to Claim 7, the vertical magnetic field produced by the magnetic elements taught by Imafuku et al. would pass through the region of the confinement rings taught by the combination of Imafuku et al. and Lenz, as broadly recited in the claim.

In regards to Claim 10, the first and second magnetic elements 73, 71 as taught by Imafuku et al. would be located below and above the variable gap formed by the confinement rings taught by the combination of Imafuku et al. and Lenz, and therefore would not "cross" the variable gap, as broadly recited in the claim.

In regards to Claim 18, each of the first and second magnetic elements as taught by Imafuku et al. has a pole from a north pole to a south pole, wherein the pole of each of the first and second magnetic elements has a direction that extends between a chamber top to a chamber bottom (i.e. has a vertical direction), as broadly recited in the claim. (Figure 12)

In regards to Claim 19, the vertical magnetic field lines passing from the first magnetic element 73 to the second magnetic element 71 as taught by Imafuku et al. would pass through the sides of the confinement rings that form the largest surfaces of the confinement rings taught by the combination of Imafuku et al. and Lenz at an angle of approximately 90 degrees, which falls within the range recited in the claim of being between perpendicular and 45 degrees.

In regards to Claim 21, since the confinement rings taught by the combination of Imafuku et al. and Lenz are arranged vertically, the pole of the first magnetic element 73 would have a direction that extends from the first to the second confinement ring (i.e. vertically), as broadly recited in the claim.

In regards to Claim 22, see the discussion of Claim 19.

In regards to Claim 23, the first and second magnetic elements 73, 71, as taught by Imafuku et al., are within the chamber walls. (Figures 11 and 12)

Response to Arguments

6. Applicant's arguments with respect to the pending claims, now amended have been considered but are moot in view of the new ground(s) of rejection made in view of the amendment to the claims.

Conclusion

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Maureen G. Arancibia whose telephone number is (571) 272-1219. The examiner can normally be reached on core hours of 10-5, Monday-Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Parviz Hassanzadeh can be reached on (571) 272-1435. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.



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